

REMARKS

Entry of the foregoing, reexamination and reconsideration of the subject application are respectfully requested in light of the amendments above and the comments which follow.

As correctly noted in the Office Action Summary, claims 1-14 were pending. By the present response, claims 1, 4, 5-8, 11-12 and 14 are amended. Thus, upon entry of the present response, claims 1-14 remain pending and await further consideration on the merits.

Support for the foregoing amendments can be found, for example, in at least the following locations in the original disclosure: page 2, lines 3 and 20; page 4, lines 20, 21, 25, 27, 30 and 31; Figures 2a-2b.

Entry of the forgoing is appropriate pursuant to 37 C.F.R. §1.116 for at least the following reasons. First, the amendments raise no new issues that would necessitate further search and/or substantive reexamination. Second, the amendments place the application in better form for appeal.

OBJECTION TO THE SPECIFICATION

The specification is objected to under 37 C.F.R. §1.75(d)(1) as failing to provide antecedent basis for the claimed "flow blades." By the present response, applicants have amended the claim term "blades" to --plate--, thereby rendering the claim terminology consistent with the specification. Withdrawal of the objection is respectfully requested.

The specification is also objected to because the claim limitation "flow blades link up to each other and extend beyond an aft facing end of the cap" is allegedly not described in the original specification in a manner sufficient to "describe, explain or support this claim limitation as an essential feature of the invention." Applicants traverse this objection. First, 37 C.F.R. §1.75(d)(1) does not require applicants to identify or otherwise characterize claim limitations as "an essential feature of the invention." Second, the original specification provides more than ample support for this limitation. See, for example, Figure 2a and the discussion thereof on lines 27-29 of page 4 of the specification:

The flow plate has been installed on the whole length of the cap surface and the flow plates link up to each other outside the cap surface extending a little over the top edge of the cap.

In light of the above, reconsideration and withdrawal of the objection is respectfully requested.

CLAIM OBJECTIONS

Claims 1, 4-8, 11 and 13 are objected to in paragraph 4 of the Official Action on the grounds that use of the term "blades" in the claims is inconsistent with the terminology used in the specification. By the present response, applicants have

amended the claims to render this terminology consistent with the specification.

Reconsideration and withdrawal of the objection is respectfully requested.

CLAIM REJECTIONS UNDER 35 U.S.C. §103

Claims 1-14 stand rejected under 35 U.S.C. §103(a) as being obvious over WO 0154971 A1 to Varis (hereafter "Varis") in view of NO 10907, and obvious over *Varis* in view of GB 9792 (NO 10907 and GB 9792 collectively referred to herein as "*Parsons*") on the grounds set forth in paragraphs 6-7 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

The present invention is directed to an improved propulsion arrangement. In particular, the present invention is directed to an arrangement in a counterrotating propulsion (CRP) system. The unique nature of CRP systems presents specific engineering and design challenges. One unique problem associated with a CRP system is an additional cavitation affect produced when the aft propulsion is pivoted, such as when a thruster is turned to steer a vessel, the aft propeller operates in the wake of the forward propeller while the aft propeller is turned at an angle relative to the forward propeller (see, e.g., page 1, lines 15-19 of the present specification). This form of cavitation is sometimes referred to as "sheet cavitation." An arrangement constructed according to the present invention minimizes the harmful effects associated with hub vortex cavitation by arranging a well-streamlined hub after the forward propeller with flow plates being disposed on the hub (see, e.g., page 4, lines 17-20). An arrangement constructed according to the principles of the present invention is set forth in amended claim 1. Amended claim 1 recites:

1. *Arrangement in a counter rotating propulsion system comprising an aft propeller installed on a thruster rotatable*

about a vertical axis, and a forward propeller installed on a shaft or on a thruster, whereby the aft propeller and the forward propeller have opposite directions of rotation and the aft and forward propellers are arranged opposing each other, each of the propellers having a hub with a cap, the hub and cap associated with the forward and aft propellers are arranged opposing each other, wherein at least two equally distributed flow plates are arranged on the cap of the forward propeller and that the flow plates are radially projecting from the cap, the flow plates link up to each other and extend beyond an aft facing end of the cap.

According to a further aspect, an arrangement formed according to the principles of the present invention is set forth in claim 11. Claim 11 recites:

11. Arrangement in a counter rotating propulsion system, comprising an aft propeller installed on a thruster rotatable about a vertical axis, and a forward propeller installed on a shaft or on a thruster, the aft propeller and the forward propeller have opposite directions of rotation and the aft and forward propellers are arranged opposing each other, wherein each of the propellers have a hub with a cap, whereby the hub and cap associated with the forward and aft propellers are arranged opposing each other, at least two equally distributed flow plates are arranged on the cap of the forward propeller and the flow plates are radially projecting from the cap, the flow plates link up to each other and extend beyond an aft facing end of the cap.

According to still another aspect, an arrangement constructed according to the principles of the present invention is defined by claim 12:

*12. An arrangement comprising:
a thruster rotatable about a vertical axis comprising an aft propeller, a first hub and a first cap; and
a forward propeller, and a second hub and a second cap associated with the forward propeller, the second cap having a diameter, the second cap comprising a plurality of equally spaced flow plates projecting from the second cap in a radial direction with no inclination and without extending beyond the diameter of the second cap;
wherein the aft propeller and the forward propeller have opposite directions of rotation;
wherein the first cap and the second cap are arranged opposing each other and are spaced apart; thereby defining a separation zone; and*

wherein the flow plates are constructed and arranged to eliminate cavitation in the separation zone when the aft propeller is not co-axial with the forward propeller, the flow plates link up to each other and extend beyond an aft facing end of the cap.

As evident from the above, claims 1, 11 and 12 each require the flow plates to link up to each other and extend beyond an aft-facing end of the cap. It is important to recognize that the grounds for rejection never even allege that *Varis* or *Parsons* disclose or even suggest this aspect of claims 1, 11 and 12. Instead, the grounds for rejection first attempt to admittedly ignore this positively claimed limitation:

Applicant's claim limitation added to claims 1, 11 and 12 and reciting "the flow blades link up to each other and extend beyond an aft facing end of the cap" is not considered to carry any significant patentable weight, since this feature is not adequately described in the specification as an essential feature of the invention.

Applicants respectfully submit that positively recited limitations appearing in the claims cannot be ignored. *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143, 147 (C.C.P.A. 1976). There is no known statutory or common law basis for requiring claim limitations to somehow be singled out in the specification as "an essential feature of the invention" before being granted patentable weight. Should the rejection be maintained applicants respectfully request that some authority be cited in support of the above-quoted assertion.

Perhaps recognizing the tenuous nature of this claim construction position, the grounds for rejection include an additional theory:

... an extension of the vanes or blades beyond an aft facing end of the cap would enhance this beneficial result by allowing water to even more effectively close in and press on the cap to impact pressure and additional forward thrust to the shaft.

It should be noted that neither *Varis* nor *Parsons* disclose the claimed limitation of flow plates that link up to each other and extend beyond an aft-facing end of the cap. The above-stated motivation is based on unarticulated assumptions concerning the mode of operation of the fins of *Parsons*. Thus, the grounds for rejection fail to explain how it is known that extending the fins, and thus producing a cap/fin design never contemplated by *Parsons*, would have the same alleged beneficial effect (i.e., producing additional forward thrust).

Thus, applicants submit that the above-stated grounds for rejection are improperly based on conjecture and hindsight, and therefor fail to establish a *prima facie* case of obviousness.

Moreover, as set forth in the attached Declaration Pursuant to 37 C.F.R. §1.132, one of ordinary skill in the art would have led away from the proposed modification involving increasing the surface area of the fins due to the known loss in efficiency caused by the increased surface area. Therefore, applicants respectfully submit that it would not have obvious to one of ordinary skill in the art to undertake the proposed modification of the fins of *Parsons*.

The proposed combination of *Varis* and *Parsons* fail to render obvious the arrangements defined by the claims of the present application, as set forth above.

In addition, it is important to recognize that, in contrast to the unique problems associated with the operation of CRP propulsion systems, *Parsons* is directed to a single propeller arrangement. The unique problems associated with CRP systems are not present during operation of the single propeller system described by *Parsons*. Thus, for example, the disclosure of *Parsons* is of minimal relevance to one of ordinary skill in the art seeking to minimize the effects of the aforementioned

"sheet cavitation" as well as the interaction between said sheet cavitation and other forms of cavitation which may be present in the operation of CRP systems. Thus, one of ordinary skill in the art seeking to modify the CRP system of *Varis*, such as in an attempt to minimize adverse consequences of complex cavitation effects experienced during operation of these systems, would not have viewed the teachings of *Parsons* as being relevant to providing modifications which would be successful in eliminating or mitigating the aforementioned complex and interacting cavitation mechanisms. In other words, it would not have been obvious to one of ordinary skill in the art to have modified CRP system of *Varis* based on the teachings of a very rudimentary single propeller system as described in *Parsons*.

Moreover, since *Parsons* involves a single propeller, and not a forward and aft propeller system, there is no guidance provided whatsoever with regard to the teachings of *Parsons* as to whether one should modify the forward or aft propeller of a CRP system such as that described by *Varis*.

For at least the reasons noted above, it would not have been obvious to have combined the *Varis* and *Parsons* references in the manner suggested.

CONCLUSION

From the foregoing, further and favorable action in the form of a Notice of Allowance is earnestly solicited. Should the Examiner feel that any issues remain, it is requested that the undersigned be contacted so that any such issues may be adequately addressed and prosecution of the instant application expedited.

Respectfully submitted,

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